BiSON Birmingham Solar-Oscillations Network

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# Carnarvon Health Check

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**Abstract**

A brief look at the current condition of Mark V and Jabba in Carnarvon.

## 1 Station History

There are two instruments in Carnarvon. Mark V is the primary instrument and was first installed in 1985. A second instrument, Jabba, was added to the site in 1997.

Carnarvon was the very first BiSON site to be converted to the Zoo. This was done in 2002 November by Brek A. Miller [1]. Previously to this the site used a PC connected to a Keithley System-570 data-acquisition system. This had started causing the computer to crash, and often would not work after the computer had been rebooted. Multiple reboots were required. Although spare parts were available to repair the Keithley, the lack of ISA slots in modern computers meant that we were unable to continue using it after the computer had been replaced.

It was quite a trip. There was a lot of work to do. Lots of new electronics had to be put in, most of which still had not been tested due to the lack of replica hardware in Birmingham and the usual rush to ship everything out to Carnarvon. Somehow everything was done in time and the fully operational site was vacated on 2002 December 20.

Shortly afterward, two catastrophes beset the station. Firstly, on 2003 March 10, the main axle bearings on the mount fell apart. Lez Schultz and his son managed put things back together using crow-bars.

Secondly, on 2003 December 28, one of the air conditioners did not reset correctly after a power failure. The room temperature and water temperature increased to such levels that three out of four of Jabba's detectors stopped working. One of the detectors came back to life by itself a few weeks later.

The next visit to Carnarvon was by George Isaak from 2004 March 17 to 2004 April 1 [2]. George discovered that the main axle was not quite in the same place as it was originally. The actuators on the fixed part of the mount no longer reached far enough out to touch the limit switches on the moving part of the mount. Two aluminium "arms" were added to the actuators to enable the limit switches to work.

George also discovered that both of Jabba's forward detectors were working, but the aft ones were not. The aft sums were saturated. This was also probably a result of the power failure. The cells did not cool correctly and potassium had condensed onto the walls of the aft cell — however George did not inspect the cells to confirm this theory. Over time, he expected they would probably clear by themselves.

George believed that the declination bearings on the mount were in bad shape. He had some sort of fix manufactured and tightened up the top hour-angle bearing.

Following this trip, the station was left unattended again until 2005 May when Ian Barnes and Steven Hale were due to visit [3]. There were trips scheduled to Carnarvon before this date, but circumstances dictated that they had to be postponed until now.

Two days before Ian and Steven were due to fly out to Australia, yet another disaster beset the station. Carnarvon was hit by a freak rainstorm that dumped over three inches of rain in just a few hours. This amount of rain is very nearly the same amount that Carnarvon can expect in a year. Unfortunately the rain detector had failed and the dome had not closed. Upstairs the mount had received a thorough drenching and the water had flooded downstairs onto the main electronics rack. The power had failed due to at least one mains-powered device becoming full of water.

A lot of work was done on this trip. A new temperature monitor was installed [4], and half of the dome rollers were replaced. Much of the damage to the instrumentation was unrecoverable and an additional trip would be required in order to complete the repairs. A spare rain detector was unavailable and so the site had to be left shutdown.

The most recent visit to Carnarvon was by Steven Hale and Roger New in 2005 August [5]. The aim of this visit was to complete the repairs undertaken in May and to get at least one, if not both, instruments working again. The rain detector was replaced and tested which allowed the dome to be switched back to automatic operation. New electronics were installed for Mark V (the Photo-Multiplier Tube Electronics Box — PMTEB [6]) and were debugged to a sufficient level to allow data-acquisition to continue, but not totally optimized. New detectors for Jabba were installed [7] but thermal-control was non-existent and data-quality poor so one was brought back to Birmingham for further testing and modification, and one was left in the aft position in Jabba for further analysis.

# 2 Current Condition

## 2.1 Data Quality

Mark V A typical day of data from Mark V is shown in Figure 1. The instrument is currently running using the original PMTEB [6]. On the last trip where the

PMTEB was installed there was only just enough time to get it working, and large offsets were discovered in several stages of data-acquisition. This hopefully will be fixed by the replacement PMTEB due to be installed in 2006 November. For comparison, data from Mark V pre-flood damage can be seen in Figure 2. There are still random "steps" occurring in data from Mark V. The cause of these is currently unknown.

Jabba

Jabba, the secondary instrument in Carnarvon will be removed and sent back to Birmingham on the next visit. A more detailed look at Jabba can be found in the "Jabba Plan".

## 2.2 Temperatures

When Jabba is removed there will be only two temperature sensors remaining in Carnarvon. These are currently being written to columns three and four of the temperature log file.

*3. Water Tank*

Stable at around 24.8°C.

*4. Electronics-Rack Ambient*

Oscillates between 28°C and 30°C due to the air-conditioning, despite a cardboard shield that prevents the air blowing directly onto the electronics.

Both of these temperature sensors are old designs that oscillate, and should be replaced with the new filtered sensors on the next trip. Also, new probes will need to be installed to replace the ones that were built into Jabba — such as dome ambient. This will result in the configuration of the temperature log file changing completely, and the above temperatures will be unlikely to stay on their current channel numbers.

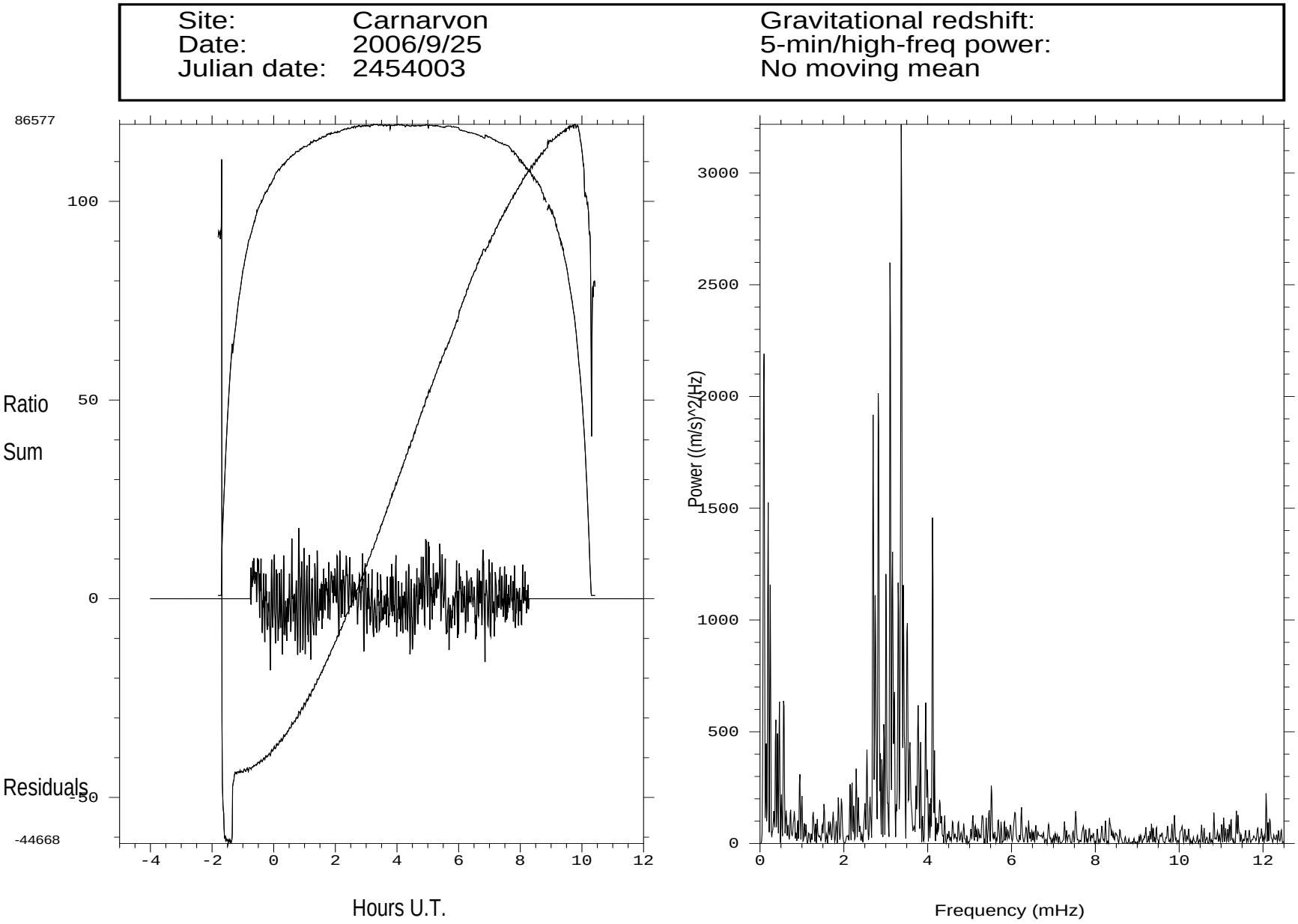


**Figure 1**: Data from Mark V in Carnarvon 2006 September 25 — post-flood damage.

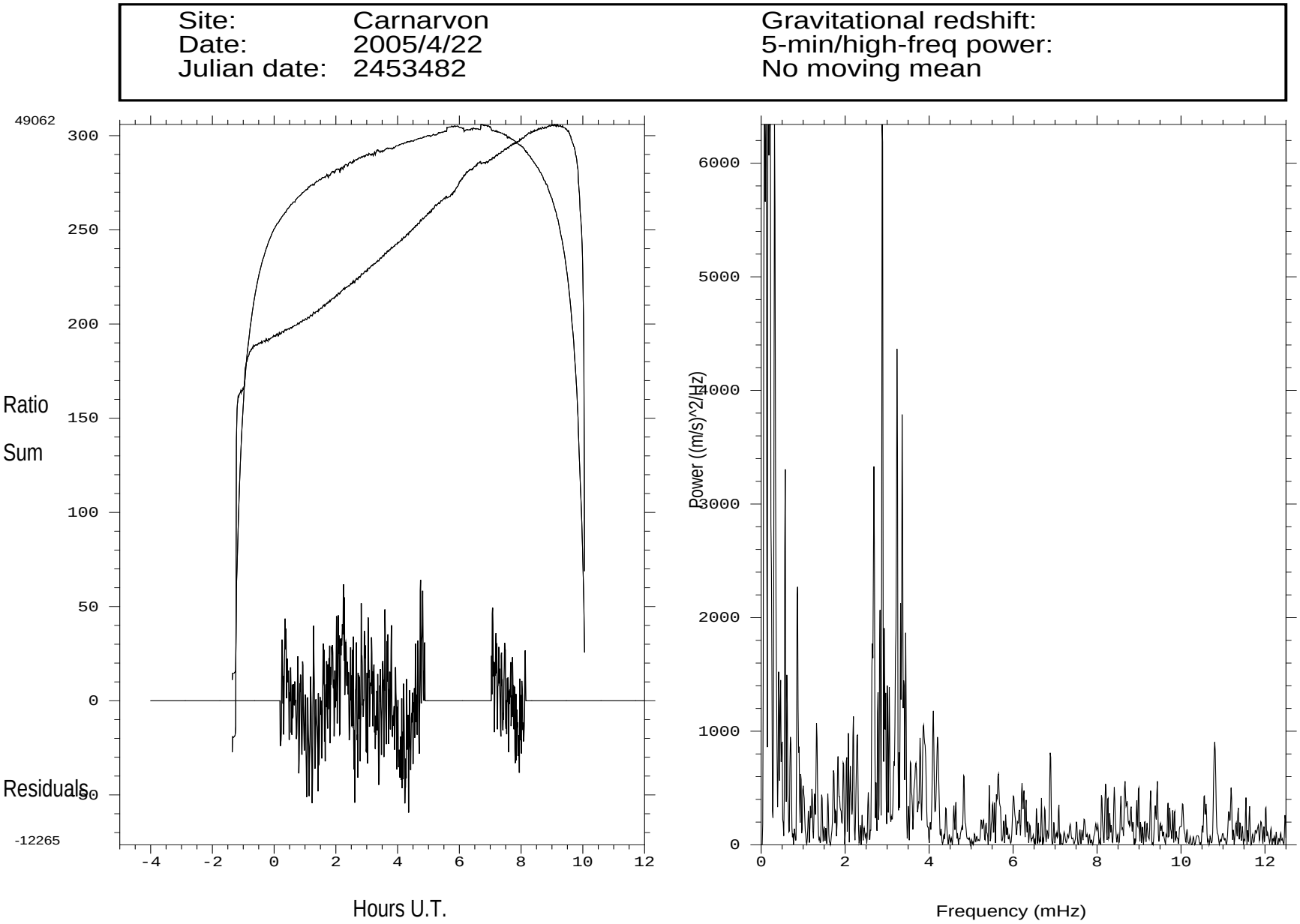


**Figure 2**: Data from Mark V in Carnarvon 2005 April 22 — pre-flood damage.

# References


[1] Brek A. Miller. The grand opening of the Carnarvon Zoo in 2002 November. *BISON Technical Report Series,* Number 193, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, January 2003.

[2] George R. Isaak. A visit to Carnarvon in 2004 March to check on the damage to the cells after a big power failure. *BISON Technical Report Series,* Number 233, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, August 2004.

[3] Ian Barnes and Steven J. Hale. Carnarvon trip report — May 2005. *BISON Technical Report Series,* Number 253, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, September 2005.

[4] Ian Barnes, Barry Jackson, Sukhpal S. "Paul" Jagpal, and Brek A. Miller. The Carnarvon Temperature Monitor. *BISON Technical Report Series,* Number 254, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, September 2005.

[5] Roger New and Steven J. Hale. Carnarvon trip report — July/August 2005. *BISON Technical Report Series,* Number 260, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, January 2006.

[6] Ian Barnes. Mark V photomultiplier electronics box (PMTEB). *BISON Technical Report Series,* Number 258, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, November 2005.

[7] Ian Barnes. The Jabba detector (JDET). *BISON Technical Report Series,* Number 257, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, November 2005.